

A

EH315298425US

Attorney Docket No. CS1055#SP

April 23, 1999

Patent, Trademark & Licensing Department

Assistant Commissioner for Patents
Box Utility Patent Applications
Washington, D.C. 20231

Telephone (410) 716 3242
Telex 407218419
Answerback 407218419 UI
FAX (410) 716-2610



RE: New U.S. Patent Application
For: POWERED OSCILLATING HAND TOOL
Inventor(s): Colin Duffy

Sir:

We enclose the following papers for filing in the United States Patent and Trademark Office in connection with the above-identified application.

1. Declaration and Power of Attorney (Unsigned).
2. Specification containing a description of the invention and nine (9) claims.
3. Two (2) pages of informal drawings.
4. Certified Priority Document.
5. Information Disclosure Statement.

FILING FEE

FOR:	(Col. 1) <u>NO. FILED</u>	(Col. 2) <u>NO. EXTRA</u>	<u>RATE</u>	<u>FEE</u>
BASIC FEE				\$760
TOTAL CLAIMS	<u>9</u> - 20=	* <u>0</u>	x18=	\$ <u>0</u>
INDEP CLAIMS	<u>2</u> - 3=	* <u>0</u>	x78=	\$ <u>0</u>
			TOTAL	\$ <u>760</u>

* If the difference in Col. 1 is less than zero, enter "0" in Col. 2



BLACK&DECKER®

09298579-042399

Page Two

The Commissioner is hereby authorized to charge the filing fee (\$760.00), and any additional fees due under 37 C.F.R. §1.16 and §1.17 during the pendency of this application to our Deposit Account No. 02-2548.

Bre S L for

Bruce S. Shapiro
Attorney for Applicant(s)
Registration No. 33,120

Enclosures

M:\WINDOWS\WINWORD\SPECS\CS1055SP.DOC

Figure 1 consists of 12 scatter plots, labeled (a) through (l), arranged in a 4x3 grid. Each plot shows the relationship between the 'Number of children' (x-axis, ranging from 0 to 10) and the 'Number of children not in household' (y-axis, ranging from 0 to 10). The plots are organized by the type of children being considered: (a) All children, (b) Children under 18, (c) Children 18-24, (d) Children 25 and over, (e) Children under 18, (f) Children 18-24, (g) Children 25 and over, (h) Children under 18, (i) Children 18-24, (j) Children 25 and over, (k) Children under 18, (l) Children 18-24. Each plot includes a regression line and a confidence interval. The plots show a general downward trend, indicating that as the number of children increases, the number of children not in the household tends to decrease. The plots are arranged in a 4x3 grid. The first row (a, b, c) shows data for 'All children', the second row (d, e, f) for 'Children under 18', the third row (g, h, i) for 'Children 18-24', and the fourth row (j, k, l) for 'Children 25 and over'. Each plot includes a regression line and a confidence interval.

UNITED STATES PATENT APPLICATION

OF

COLIN DUFFY

FOR

POWERED OSCILLATING HAND TOOL

FILED

APRIL 23, 1999

DOCKET NO. CS1055#SP

09298579 042399
662240 64586260

POWERED OSCILLATING HAND TOOL

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a powered oscillating hand tool, in particular a
5 powered oscillating hand tool comprising a drive unit having an electric motor with a drive
shaft to which a sander head can be attached.

Description of the Prior Art

In conventional sanders of the orbital type, with a shaped shoe, the drive system
comprises an eccentric which is restrained so that the sander shoe cannot spin independently
10 of the motor and it therefore describes a regular orbit. The shoes of such sanders are available
in a range of shapes and such sanders are in general used for the removal of relatively small
quantities of material, for example for detailed work or for finishing. The base of the shoe
may be provided with a surface, in particular a hook and loop surface, on which an abrasive
sheet may be mounted.

15 European Patent No 610 801 describes a sander which carries a triangular shoe which
can be detached from the body of the sander by means of an operating button located at the
front corner of the sander. The operating button carries a bolt which is resiliently mounted on
the tool and is biased towards engagement under a catch hook provided in the triangular shoe.
The sander is further provided, on the edge opposite the operating button, with at least one
20 engagement opening for engaging at least one support claw provided on the triangular shoe.

It is a disadvantage of such an arrangement that it is expensive to manufacture and
may be difficult to operate to attach and detach the shoe, in particular under the conditions in
which the sander is likely to be used.

SUMMARY OF THE INVENTION

25 It is an object of the present invention to provide a sander in which the above
disadvantages are reduced or substantially obviated.

The present invention therefore provides a powered oscillating hand tool comprising

- (a) a drive unit having an electric motor and a drive shaft;
 - (b) a bearing eccentrically mounted on the drive shaft and located radially
30 eccentrically relative to the drive shaft;
 - (c) a carrier plate mounted on the bearing and
 - (d) a platen for mounting on the carrier plate
- characterised in that the carrier plate is provided with a first engagement means and the platen

is provided with second engagement means to engage with the first engagement means by rotation of the platen relative to the carrier plate.

The first and second engagement means preferably together form a bayonet fitting, more preferably a bayonet fitting of the type in which the first engagement means (provided on the carrier) is in the form of one or more apertures and the second engagement means is in the form of one or more hook members.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of a powered oscillating hand tool according to the invention will now be described with reference to the accompanying drawings in which

Figure 1 is a side view, in section of a preferred embodiment of a powered oscillating hand tool according to the invention, with a platen attached;

Figure 2 is a perspective view of the carrier plate of Figure 1, viewed from above, and

Figure 3 is a perspective view of the platen of Figure 1, viewed from above.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows a sanding device (10) comprising a drive unit (2) including an electric motor (4) located in a housing (6) and a drive shaft (8). A fan (12) mounted on shaft (8) is arranged to draw air in from mouth (14) of a carrier plate (16) permanently mounted to the sanding device (10) and direct it through extractor duct (18) to exhaust outlet (20). Mounted on the drive shaft (8) is a counterbalance (24). The counterbalance (24) is necessary because mounted thereon is a bearing (26). The bearing (26) is eccentrically mounted relative to the drive shaft (8) and hence the need for the counterbalance (24). It will be readily appreciated by those skilled in the art that the counterbalance (24) has an excess of weight in the radial direction (relative to the axis of the drive shaft (8)) diametrically opposite to that of the radial direction in which the bearing (26) projects furthest away from the drive shaft (8).

Any suitable method of mounting the counterbalance (24) on the drive shaft (8) may be employed. In this example, a simple press-fit is used. The same method may be employed to mount the bearing (26) on the counterbalance (24).

In the example shown with reference to figure 1, the counterbalance (24) and the fan (12) are formed as a single unit around the drive shaft (8). This is simply for ease of manufacture. They could each be formed as separate units and individually mounted on the drive shaft (8).

The carrier plate (16) is mounted on the bearing (26) by any suitable means. In the present example, the carrier (16) is press-fitted into engagement with the bearing (16)

although it could equally well be secured by moulding or using a nut or the like.

Three flexible columns (28) made of rubber are arranged around the drive shaft (8). The upper end (30) of each of the flexible columns (28) is held in the housing (6) and the lower end (32) is located in a recess (34) provided in the carrier plate (16).

5 A platen (36) is detachably mounted on the carrier plate (16), as will be described in more detail with reference to Figures 2 and 3.

The carrier (16) is driven by the electric motor (4) through drive shaft (8). Rotation of the drive shaft (8) will cause the radially internal portion of the bearing (26) to rotate concomitantly. Because the radially external portion of the bearing (26) is in rigid contact
10 with the carrier (16), then this particular portion does not rotate. Because the carrier (16) is restrained from free rotation by the flexible columns (28), then the carrier (16) will exhibit an orbital motion on rotation of the drive shaft (8). A perforated sandpaper sheet (not shown) may be attached to the outer face (38) of the platen (36), for example by the use of hook-and-loop fabric such as that sold as VELCRO® glued to face (38). Holes (40) passing through
15 the platen (36) facilitate the removal of dust etc., from the sanding face through the platen (36) to exhaust outlet (20) via the duct (18). An extractor hose (not shown) may be attached to the exhaust outlet (20).

As can be seen from Figure 2, the carrier plate (16) is made from a plastics material, for example glass filled nylon and carries on its underside a plurality of strengthening ribs
20 (not shown). The carrier plate (16) includes three recesses (34) which are used to couple the carrier plate (16) to the sanding device (10) by means of the flexible columns (28) which locate in the recesses (34) in known manner. The centre of the carrier plate (16) has a boss (42) which is used to mount the carrier plate on the bearing (26).

The carrier plate (16) has a plurality of holes (44) formed therein and spaced at 120°
25 around the central boss (42). The holes (44) are formed so that each can accept one of a plurality of projections formed on the platen (36) which will be described in more detail below. The holes (44) are shaped so as to provide an area of relatively large cross sectional area which narrows down to a strip of narrow width. Flanking each hole (44) and extending substantially along the length from the relatively large cross-sectional area to the end of the
30 relatively narrow strip is a further hole (46). These holes (46) narrower than holes 44 and are formed so as to allow the piece of plastics material (48) from which the carrier plate (16) is formed and which is situated between the holes (44) and (46) to act as a spring mechanism. The hole (44) is shaped so that an inwardly projecting piece (50) of the plastics material of

the carrier plate (16) is formed at the position shown and acts as a detent.

It will also be seen from Figure 2 that each hole (44) is associated with a vertically displaced platform (52) which projects inwardly opposite detent (50). Flat wall (58) extends vertically upward along one side of platform (52).

5 The platen (36) is provided with a plurality of projections (54) projecting from the inner face of the platen (36). In order to mount the platen (36) on the carrier plate (16) the platen (36) is oriented such that projections (54) are situated directly below each of the holes (44). The platen (36) is then urged toward the carrier plate (16) so that the projections (54) protrude through their respective holes (44). As can be seen from the relative orientation of
10 each of the projections (54) and holes (44), when the platen (36) is rotated by approximately 24° then the outer peripheral shapes of the platen (36) and carrier plate (16) coincide and also the projections (54) are rotated about the boss (42) such that they are held within the holes (44) by way of the projection (50) acting as a detent and also the strip of material (48) of the carrier plate (16) between the holes (44) and (46) acting as a spring urging this detent into
15 engagement with each projection (54). As can be seen in particular from Figure 3, each projection (54) has an overhanging hook (60) which further includes a portion (56) formed as a flat face. When the platen (36) and carrier plate (16) are rotated so as to be locked together as described above, this portion (56) lies flat against face (58) of the carrier plate (16). This is necessary so that the majority of the oscillating driving force is imparted to platen (36) by the
20 carrier plate (16) through these flat and abutting faces (56), (58). The platen (36) is retained from separating and therefore falling off the carrier plate (16) by way of hook (60) shown in Figure 3 co-operating with the platform (52). As has been described above, the platform (52) is situated in a plane which is vertically displaced from the plane of the carrier plate (16) and standing proud thereof. The hook (60) therefore sits between the platform (52) and the plane
25 of the carrier plate (16) and in this way the platform (52) acts as a vertical catch for the hook (60).

In order to prevent the tip portion of the platen (36) coming away from the carrier plate (16) the platen (36) carries a first ramp surface (62) as shown in Figure 3, which ramp surface (62) co-operates with a second ramp surface (64) in the carrier plate (16). It will be
30 understood that the coupling mechanism between the first ramp surface (62) and second ramp surface (64) operates to engage the two surfaces, when the platen is rotated to engage the projection (54) and its hook (60).

As can also be seen from figures 2 and 3 a screw (not shown) aids securing the platen (36) to the carrier (16) in addition to the coupling mechanism described above. In particular, the screw serves primarily to prevent the platen (36) from rotating relative to carrier (16) during orbital motion. A boss (70) acts as a guide hole for the passage of the screw (not shown) through the platen (36). The screw then screws into the threaded blind hole (72) in the carrier (16) to secure the platen (36) to the carrier (16).

One more alternative platen (36) can be provided, for use in different sanding operations, such as for detail sanding, sanding louvres, where the platen is provided with a finger extension and contour sanding.

CLAIMS

1. A powered oscillating hand tool comprising
 - (a) a drive unit having an electric motor and a drive shaft;
 - 5 (b) a bearing eccentrically mounted on the drive shaft and located radially eccentrically relative to the drive shaft;
 - (c) a carrier plate mounted on the bearing and
 - (d) a platen for mounting on the carrier plate characterised in that the carrier plate is provided with a first engagement means and the platen is provided with second engagement
 - 10 means to engage with the first engagement means by rotation of the platen relative to the carrier plate.
2. A powered oscillating hand tool according to claim 1, characterised in that the first and second engagement means together comprise a bayonet fitting.
- 15 3. A powered oscillating hand tool according to claim 2, characterised in that the first engagement means comprises one or more apertures and the second engagement means comprises one or more hook members.
- 20 4. A powered oscillating hand tool according to claim 1 which is a sander.
5. A powered oscillating hand tool according to claim 3 which is a sander.
6. A power oscillating hand tool comprising:
 - 25 a drive unit;
 - a carrier plate mounted on the drive unit and driven thereby, said carrier plate including a plurality of holes, each said hole having a substantially horizontal platform extending from one side of the hole;
 - a platen including a plurality of projections extending from an upper surface
 - 30 thereof, each projection corresponding to one said hole and including a hook;
 - wherein, said platen is removably secured on said carrier with each projection extending through a corresponding hole with said hook resting upon said platform to maintain said platen on said carrier.

7. The tool recited in claim 6, said plurality of holes each including a substantially vertical flat face formed along one side of said platform, said hooks each including a flat face formed along one side thereof, wherein, said flat faces of said holes abut said flat faces of said hooks.

8. The tool recited in claim 7,
said carrier plate holes each having an inwardly projecting detent extending from one side of the hole, said substantially horizontal platform extending from an opposite side of the hole, said carrier also including a plurality of second holes, one said second hole formed adjacent each first said hole and providing an inward spring bias to said detents,
wherein, said platen is secured on said carrier with said detents biased into contact with said projections.

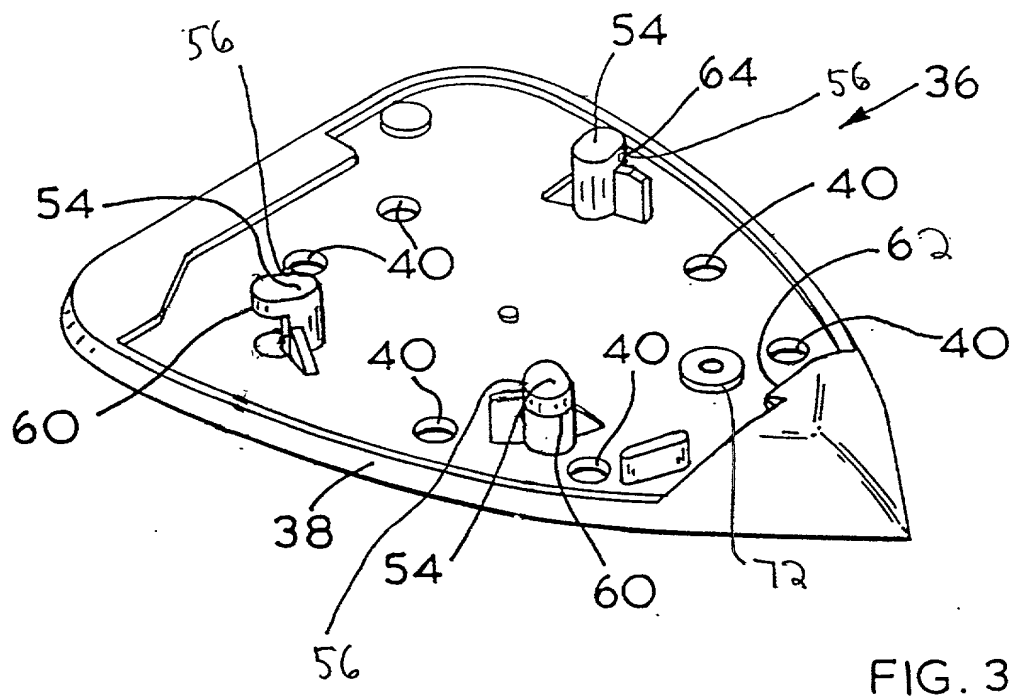
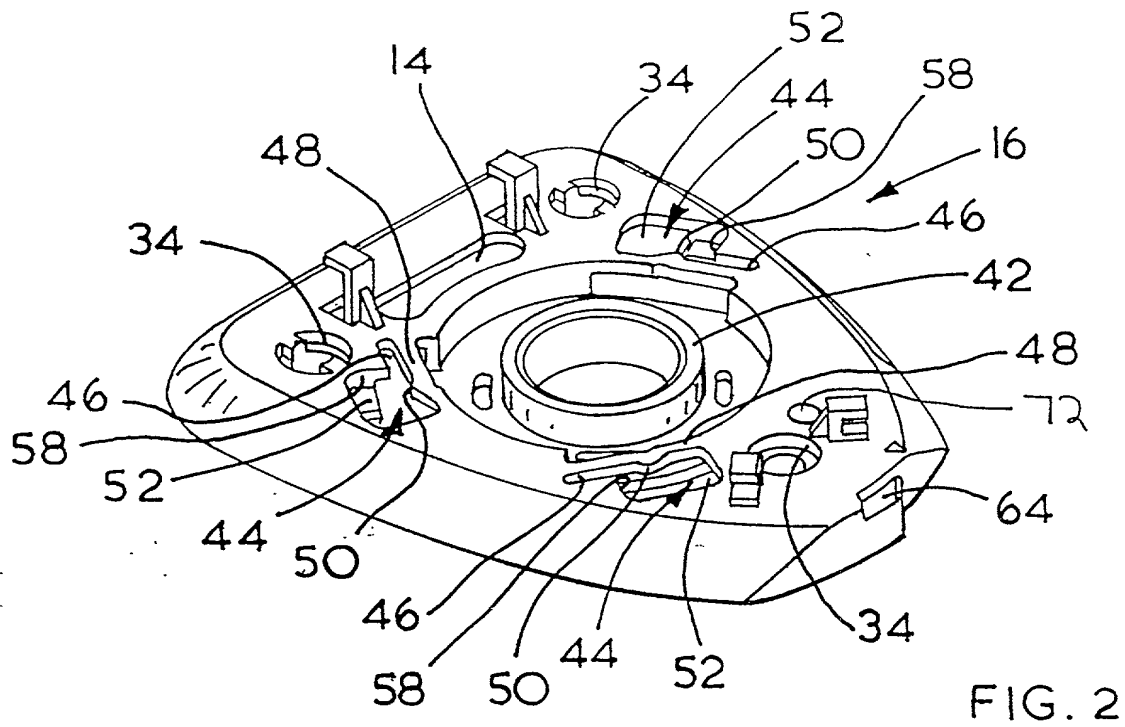
9. The tool recited in claim 6,
said carrier plate holes each having an inwardly projecting detent extending from one side of the hole, said substantially horizontal platform extending from an opposite side of the hole, said carrier also including a plurality of second holes, one said second hole formed adjacent each first said hole and providing an inward spring bias to said detents,
wherein, said platen is secured on said carrier with said detents biased into contact with said projections.

ABSTRACT

5 A powered oscillating hand tool includes a drive unit having an electric motor and a drive shaft; a bearing eccentrically mounted on the drive shaft and located radially eccentrically relative to the drive shaft; a carrier plate mounted on the bearing and a platen for mounting on the carrier plate. The carrier plate is provided with a first engagement means and the platen is provided with second engagement means to engage with the first engagement means by rotation of the platen relative to the carrier plate. The first and second engagement means together comprise a bayonet fitting.



FIG. 1



EH315298425US

ATTORNEY DOCKET NO. CS1055#SP

COMBINED DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION

As a below named inventor, I hereby declare that: my residence post office address and citizenship are as stated next to my name; that I verily believe that I am the original, first and sole inventor (if only one inventor is named below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: *POWERED OSCILLATING HAND TOOL the specification of which is attached hereto unless one of the following boxes below is checked:

- ☐ The Specification was filed on April 23, 1999, was assigned Serial No. _____ and was amended on _____
- ☐ was filed as PCT international application number _____ on _____ and was amended under PCT Article 19 on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I do not know and do not believe the same was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof, or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as follows:

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below:

Prior Foreign Application(s)			Priority Claimed	
9809030.1	U.K.	04/29/98	X	
Number)	(Country)	(Month/Day/Year Filed)	Yes	No
_____	_____	_____	_____	_____
Number)	(Country)	(Month/Day/Year Filed)	Yes	No

0938579 04339 66240 62586260

All Foreign Applications, if any, for any Patent or Inventor's Certificate Filed More Than 12 Months Prior To The Filing Date of This Application:

Country	Application No.	Date of Filing
_____	_____	_____
_____	_____	_____

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

_____ (Application No.)	_____ (Filing Date)	_____ (Status-Patent, Pending, Abandoned)
_____ (Application No.)	_____ (Filing Date)	_____ (Status-Patent, Pending, Abandoned)

I hereby appoint the following attorneys to prosecute this application and/or an international application based on this application and to transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting, patent based on instructions received from the entity who first provides said attorneys with a written notice to the contrary:

Adan Ayala, Esq., Registration No. 38,373	Kerry H. Owens, Esq., Registration No. 37,412
Dennis A. Dearing, Esq., Registration No. 26,653	Bruce S. Shapiro, Esq., Registration No. 33,120
John D. Del Ponti, Esq., Registration No. 24,258	Charles E. Yocum, Esq., Registration No. 30,121
J. Bruce Hoofnagle, Esq., Registration No. 20,973	

Send Correspondence to: Bruce S. Shapiro - TW199
Patent Department
The Black & Decker Corporation
701 East Joppa Road
Towson, Maryland 21286
Tel. (410) 716-3254

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity or the application or any patent issued thereon.

GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE
Colin Duffy			
RESIDENCE (CITY, STATE & COUNTRY)			CITIZENSHIP
24 West Terrace, Spennymoor DL16 7BW U.K.			U.K.
POST OFFICE ADDRESS (COMPLETE STREET ADDRESS INCLUDING CITY, STATE & COUNTRY)			
24 West Terrace, Spennymoor DL16 7BW U.K.			
GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE
RESIDENCE (CITY, STATE & COUNTRY)			CITIZENSHIP
POST OFFICE ADDRESS (COMPLETE STREET ADDRESS INCLUDING CITY, STATE & COUNTRY)			
GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE
RESIDENCE (CITY, STATE & COUNTRY)			CITIZENSHIP
POST OFFICE ADDRESS (COMPLETE STREET ADDRESS INCLUDING CITY, STATE & COUNTRY)			
GIVEN NAME	FAMILY NAME	INVENTOR'S SIGNATURE	DATE
RESIDENCE (CITY, STATE & COUNTRY)			CITIZENSHIP
POST OFFICE ADDRESS (COMPLETE STREET ADDRESS INCLUDING CITY, STATE & COUNTRY)			